

CQ-TV

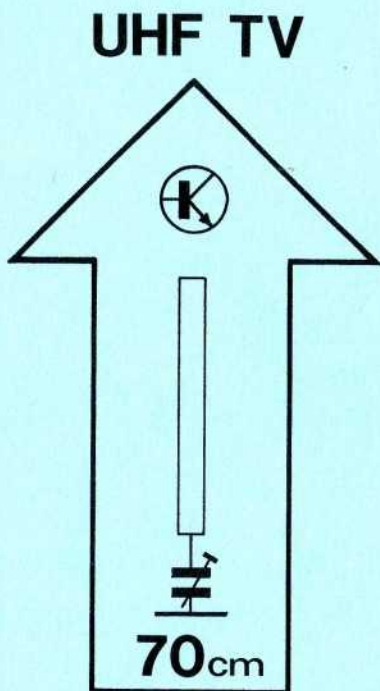
MAGAZINE

No. 112

BRITISH AMATEUR TELEVISION CLUB

November 1980

ATV up-converter
video switcher
log periodic aerial
NBTv review
convention report



ATV UP-CONVERTER

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CLOSE FOR PRESS DATE FOR THE FEBRUARY 1981 ISSUE....1st Jan 1981.

Editorial

It is with much pride, perhaps tinged with a certain apprehension that I pen this, my first editorial as editor of CQ-TV.

It has been said that the club whose members are spread not only throughout the United Kingdom but all over the world is only as good as its magazine. In many respects this is true since it is only through the magazine that the majority of members keep in touch with the club and the club keeps in touch with its members. It must further be said that the magazine is only as good as its subscribers since it is from them that most of the copy comes which is used in the magazine. My job as editor is therefore not to write the magazine but to collect all the material together, work them into a balanced framework and present the whole in an orderly and pleasing manner.

As with any new editor there are bound to be changes in the approach to the task. Some changes will become apparent as you read through the magazine, one will already have struck you, and that is the front cover design. I felt it was important to standardise the heading of the cover, this makes it instantly recognisable and brings a uniformity to the positions of the magazine number and date. The rest of the cover will reflect something of the magazines content, shown this time in one of my own graphic designs.

You will notice too that the typeface is slightly larger, this is because I have adopted a new format in the production stage which will I hope help those members who in the past have found the print a little difficult to read.

Being new to the job I obviously have much to learn and will inevitably make mistakes. I am therefore always happy to listen to suggestions and constructive criticism which may help to make the magazine as you want it.

As you realise, since Andy Hughes gave up the 'hot seat' the last two issues have been produced by a small team of members who stepped into the breach in time of need. My thanks therefore go to Lewis Elmer, Mike Crampton and Graham Shirville for their excellent work.

I look forward to a long and happy association with CQ-TV and have pleasure in presenting this, my first magazine, for your approval.

John L. Wood. G3YQC

CONVENTION 1980

The day dawned brightly on Sunday the 5th of October and the weather forecast looked good, it seemed as though the market stalls in the car park would be in full swing without too much risk of rain.

The convention opened at 10am at the Post House Hotel in Leicester. The hotel is a sprawling modern structure which, like others in its chain, cater especially for meetings and conventions. Two main rooms were hired - the Wolsey room, which was used as a lecture theatre for the video tape shows and the Prestel presentation and the Wyggeston room which held the static displays.

By 11am a good number of people had arrived and these were invited to attend the BATC AGM. After the formalities the Treasurer gave his report on the adopted accounts for 1978-9, also his report on the current years finances to date.

Mike Crampton, G8DLX was elected Chairman and Trevor Brown, G8CJS became General Secretary. (a full list of officers and committee members is given in the inside cover of this issue)

Alan Pratt and Andy Hughes were given a vote of thanks for their work for the club and Andy was presented with a tankard for his long service as editor of CQ-TV.

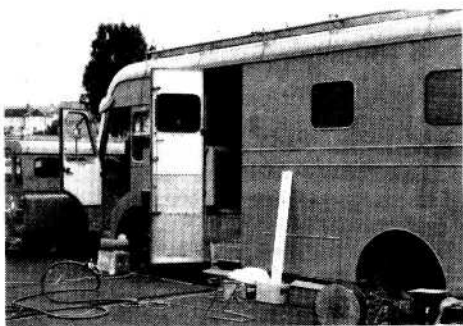
The meeting ended at 12.30 and lunch was taken.

Members continued to arrive for the afternoon session and by 2.30 the rooms were quite crowded.

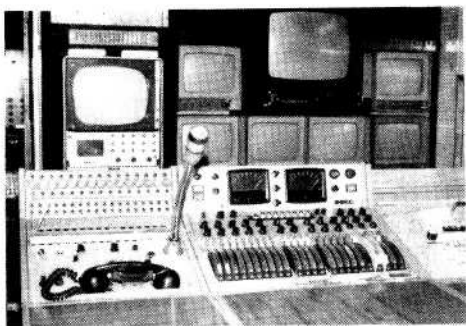
Video tapes of general amateur TV interest were shown and included a tape made by the Gwent TV group together with Trevor Brown, a copy of this tape was sent to the Australian amateur television society in exchange for one sent to us earlier this year.

A presentation consisting of a tape and slide lecture of the Prestel video information system was given by representatives from the Post Office. Details of hardware, marketing uses and facilities, and a breakdown of costs to the consumer were discussed.

Dotted around the Wyggeston room and outside on balconies and the car park could be seen several large professional TV cameras for people to operate, these were mounted on tripods and could be dollied around as required. The cameras were fed into a complete outside broadcast unit owned by Brian Summers, the interior of the van was impressive indeed with all the camera control equipment together with preview and master monitors, a vision mixing desk and a complete VTR system. It was rumoured that the OB unit was drawing upwards of 16 Amps from the Post House mains supply!



Brian Summers' outside broadcast unit.



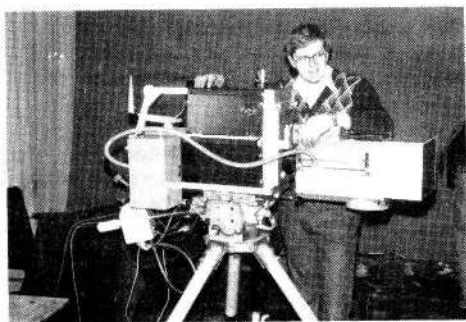
Inside the van showing the mixing desk and monitors.



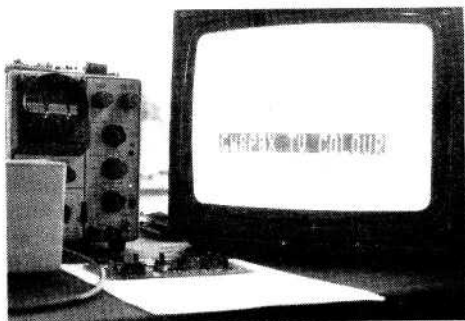
Paul Surtees grabbing the money at the BATC stand.



A happy band of members in the lecture theatre.



"Hows this for a camera?"
From the outside broadcast van.



Part of GW8PBX and GW3JGA's colour display.

More pics on page 23

Several members had brought along equipment for sale and this was displayed outside in the car park. Business seemed to be quite good although it is reported that the volume of trade in purely financial terms was less than expected, this seems to reflect the current economic recession throughout the country.

Back inside, John Lawrence GW3JGA displayed his 70cm up-converter which uses a very nicely made PC board and attracted much interest since the design was very straightforward. It is hoped to market either the boards or a kit of parts in the near future. John seems to be working in conjunction with David GW8PBX and their combined display included a working PAL colour coder which will be featured in the new handbook. The display was an electronically generated caption inlaid over a continuously changing plain colour background, this was done mainly to demonstrate the linearity of the coder. The effect was very pleasing and people were seen staring at the screen for long periods apparently mesmerised by the beautifully flowing colours. The system was driven by a free running SPG and colour sub-carrier oscillator which demonstrated that the sub-carrier need not necessarily be locked to the main signal in order to obtain good results.

Next was Derek GW3FDZ who demonstrated a very versatile character generator unit which was fully adjustable in size and screen position. This was inlaid into a live picture from a vidicon camera.

G8YGT had an image orthicon camera channel on display. The camera had a beautiful long zoom lens and produced a superb black and white picture. The display also included a completely home designed vestigial sideband transmitter in prototype form, judging by the photos taken from off air colour transmissions the unit works very well indeed. Full design details were given in a large loose leaved book, never before has so much detail been written about a piece of home constructed amateur equipment although to be fair it was done as a special college project.

Trevor Brown G8CJS had some of the prototype projects from the new handbook on display together with some PC boards which are to be made available. All the boards are of a similar size and are intended to plug into a card frame system if required. Copies of much of the new handbook's manuscript was also shown but only just enough to whet the appetite! A colour photo of the electronically generated test card drew much interested admiration, full details of the test card generator will appear in the new handbook.

SSTV was well looked after by Grant Dixon G8CGK who demonstrated his 5FP7 monitor, his own designed pattern generator and a DL2RZ fast to slow scan receiving system which certainly illustrates just how good SSTV can be using up to date techniques, it has certainly come a long way since its early Cop' Mac Donald days. PC boards for Grants pattern generator and monitor designs were also available and by all accounts quite a number were sold reflecting the high level of interest in SSTV. Grant also exhibited his home built 8080 based Triton microcomputer which is an integral part of his SSTV equipment. He had many interesting programmes which he has written and included one that created pages

of text on the VDU screen and then converted them to SSTV for transmission. Several pages could be created, stored, edited, recalled and transmitted at will. It seems that there is a great future for the microcomputer aided generation and reception of slow scan television signals.

The BATC of course had its own stand which was set up and run by Mike Crampton G8DLX and Paul Surtees G8OVX, club sales did fairly well and in fact the PC boards for Project 100 were completely sold out. It is a pleasure to report the signing up of quite a few new members. Many back issues of CQ-TV were sold.

Doug Pitt, the Chairman of the Narrow Band Television Association demonstrated a Nipkow disc 32 line TV system which was working very well and drew quite a crowd. It was good to be reminded of how it all began for without the Nipkow disc system we may not have had television as we know it today.

It just remains to thank Mike Cox G8HUA for his organisation and to express our appreciation to all the members who helped make our 1980 convention one to remember.

Christmas is coming!



Someone, somewhere is just waiting to buy you a present.

How about a BATC LAPEL BADGE?

only 40p, or a deluxe PERSONALISED lapel badge with YOUR OWN CALLSIGN at only 70p. No motorist should be without a BATC KEY FOB, 50p, and for the party a BATC CLUB TIE for just £1.80p

Dont forget the BATC EQUIPMENT STICKERS (15p) and CAR WINDSCREEN STICKERS at 10p.

All these are available from Club Sales, "Kyrles Cross", Peterstow, Ross-on-Wye, Herefordshire. HR9 6LD.

Postage on all the above is 12p except ties which are 20p.

LEAVE THIS ADVERT OPEN ON THE TABLE AND DROP A FEW HINTS, JUST IN CASE.



EDITORS POSTBAG

Dear Sir,

I had some leaflets from Volker, DL2RZ today. His latest venture is the SC422 scan converter. This converts slow scan to fast and fast scan to slow and uses a total of 128K bits of memory contained in 16K RAM ICs. There is the capability of using his electric pen that allows writing on pictures etc. Provision is also made for using the KB422 keyboard. Prices are in Deutschmarks and are; SC422 scan converter, DM2100 and the keyboard, DM480. You can also buy the SC160 scan converter kit, this uses 64K of memory on two boards and comes complete with all components but no cabinet or PSU which are available as extras. This converter is also slow to fast and fast to slow and is fitted with a tuning meter, the outputs on fast scan feed direct to a monitor or to a TV via a modulator. An English version with literature is available in about November. Price for the kit is DM770 and assembled and tested DM895.

There is also available a 9" fast scan monitor at DM498 and a camera for DM568.

Most of the data given is in German and is available from DL2RZ. If any one needs his address I would gladly supply it.

J. Brown. G3LPB
1 Silverdale Road,
Falmouth,
Cornwall. TR11 4HW

Dear Sir,

Although there is a curious lack of amateur TV RF hereabouts, lack of interest in television does not seem to be the reason. Every time I mention ATV on 2 Meters I usually find a favourable reaction, yet few amateurs seem willing to take the plunge. This despite the availability of cheap (well relatively cheap) colour cameras, VTRs and now commercial transmitters such as the PC Electronics unit. I'm convinced that as SSTV is gaining momentum so also must full colour fast scan TV. Why should you just talk to someone when you can exchange pictures as well? I'm always aware of the comment in A5 magazine which says 'ATV'ers should be seen as well as heard'.

My own progress has been painfully slow as I stopped all construction to build a decent shack, which is now completed. A year after installing an 8XY for 2m and an 88 element multibeam for ATV I was forced to take the aerials back down as they were damaging the end wall of my house. So pending a good tower, I've decided to press on with the video side in the shack leaving the RF till later. First project is the CQ-TV P100 SPG and pattern generator with PSU's and PDA's built in. I've already started on this, with eventual colour transmission in mind, plus a monochrome slide scanner and colour synthesiser and encoder to follow.

I intend to place emphasis on the presentation of the video so that the viewer is presented with something worth watching. This may be one reason for the present low activity in this area.

I offer these few lines in the hope that maybe, just maybe it may prompt a few enthusiasts to have a go at what seems to me the most exciting and technically challenging mode of our diverse hobby. Perhaps a Scottish subsection of BATC would help promote activity and interest.

Comments please. It would certainly spur me on to actually radiate something.

N. Macdonald. GM4BVU

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 * TV ON THE AIR Andrew Emmerson, G8PTH *
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Well here we are, under new management. Yes, it's a new name and address to send the contributions to, but I hope you will support me as well as you did John while he was writing this column. I am pleased to say there is quite a lot of material this time, so we'll launch straight into it and not worry too much about the order it's in (or should be!).

First of all a word about maps. I am delighted to say that map of the area east of London in the last CQ-TV aroused some interest and I was supplied with two excellent maps by Garry G4CRJ and the G8CJS/G8GQS consortium. They are reproduced here and I would like all other active groups to send me similar maps showing where the stations are. They are helpful to newcomers and non-transmitting SWL stations who may not know where the activity is. I am gradually transferring all the stations to a map of all Britain and this will be an impressive recruiting aid when the BATC stand tours the rallies and exhibitions.

Talking of exhibitions, can I add my thanks to all those who made the Convention in Leicester such a worthwhile event. The I.O. camera chains and the O.B. van with all its equipment were a rare sight!

Practical demonstrations of ATV are an excellent way of putting over our hobby to a wider audience. Visitors to the Stoneleigh Town and Country Festival were treated to just such a demonstration this year. Trevor G8CJS writes to say that he brought along his pedestrian portable TV transmitter together with Mike G8DLX who provided the RX side of things. Cotron Electronics lent a large monitor which completed the station. Many people found themselves being televised and indeed lots of others helped out as volunteer cameramen over the three day event. They included G3VZV, G8TWH, G8PEE, G8MFP, G8IME, G8KVU, G3ZNI and G8GMJ. The vision took place on 70 cm with a power of about 2 watts while two metres was used for talkback and coverage of about a 1 mile radius was possible using colinear aerials vertically polarised for both RX and TX.

An ATV stand was also provided at the Brighton Mobile Rally this summer, with the Kent Video Group showing the Sussex mob how its done. The stand was right next to the bar, which ensured plenty of visitors. On display were the various P100 modules in operation and some stunning colour graphics from Graham G8MBI's ITT 2020 computer. Surprisingly, no Sussex ATV stations made themselves known. If you do exist, how about dropping me a line?

John G3YQC, the former scribe of this column, has of course moved QTH and says he notices the improvement. In his first weekend QRV again it was the International Contest: he writes "I can honestly say I have never heard so many people on a TV contest before. The best DX for me was the Gwent TV Group who were portable north of Newport in South Wales. A distance of 145 km was not bad and it shows that the PC Electronics TX still works well after the bashing about during the move. In fact I just plugged it in and switched on and found it to be still perfect. The contact with GW800J/P was made using the PC transmitter barefoot into an 18 element Parabeam." That was presumably without a lift - certainly conditions for the contest were as flat as a pancake down in the south eastern corner.

That is not to say there haven't been a few openings lately. The 7th September enabled Rod G8VBC near Derby to send colour down to Kent and this was repeated on the 3rd October when VBC, G4DYP (Cannock Chase) and G3YQC (Rugby) worked G8EQZ, G8SUY, G3OXH and yours truly scattered at various locations across Kent. Diversity effects were very apparent on that second occasion: with both VBC and DYP transmitting southwards one station would be received in the Medway Towns and be totally invisible but swamped by the other 25 miles further away near

Canterbury. Then the balance would alter and as one station faded away, the other would come in. On the 25th September G8SUY got a video signal to G3YQC even though two metre contact was totally impossible (G4DYP acted as link man). So the moral is, if you think there might be a lift, how ever slight, put out a video QQ, even if there is nothing to be heard on two metres!

A recent conversation with Kris Partridge G8AJU (of Repeater Handbook fame) revealed that ATV activity in Poland is growing. We'd be delighted to publish details - BATC is a truly international club. And we'd like to hear of ATV activity in Ireland: we never hear of anything going on over there. A recent missive from the States claimed that South California has the highest ATV activity level in the world, with over 100 active stations. I wonder ...

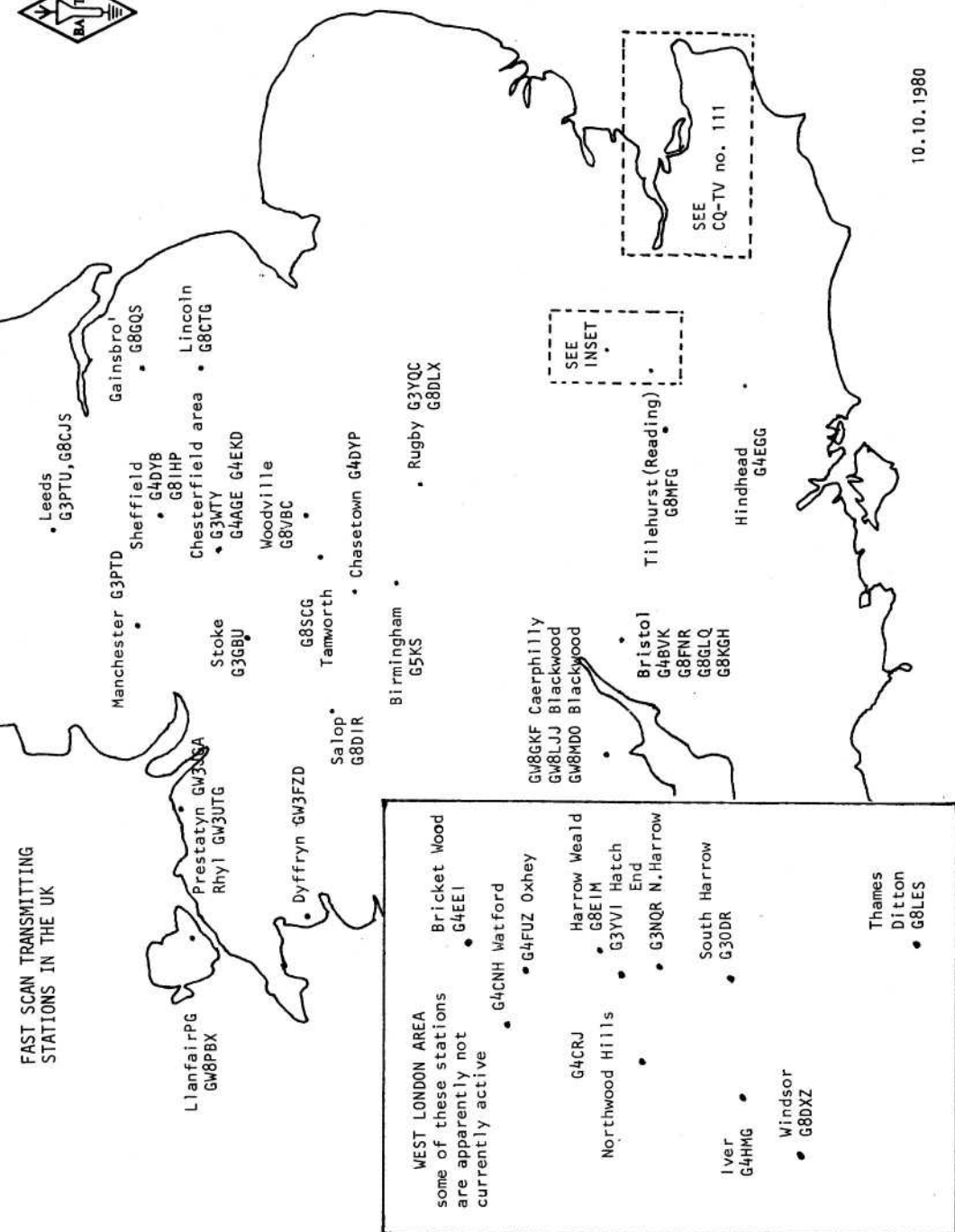
Finally a little more international news, culled from the Benelux DX Club newsletter. Reporting on the extremely good conditions of the 28th and 29th November of last year it says

"The UHF Band was a French-Anglo chaos. This was so because there was a temperature of 15°C at 600 metres while on the ground it was only 9°. Through this inversion layer there was a very good transmission of TV signals, most of all from France. This could very well be noted in the amateur channel when TV amateurs from Paris and further south could be seen with excellent quality, especially from central France. Even a station (F1AGO) from a distance of 700 km could be seen." The following G stations were recorded as logged in Holland: G3NOX, G3PTU, G3VZV, G4IMO, G4CRJ, G8DTQ and G8EQZ. Photos of most of these stations were printed. An even bigger sensation occurred around midnight when several Dutch stations saw EA1CR come up on their screens, but unfortunately this was F3YX winding them up with a video recording he had made the same evening. Mind you, from EA1CR to F3YX is not a bad hop, and from F3YX on to Rotterdam!

That's all for this time. Please send your reports and photos to me at 4 Mount Pleasant, Blean Common, CANTERBURY, Kent, CT2 9EU.

P.S. A note on the map printed with this article. I know it's incomplete and it will inevitably contain errors, so please write and tell me if your call is wrong or missing. If the SSTVers send me details I'll prepare a separate Slow-Scan map. I apologise for leaving off RX-only stations but there wasn't really enough room for them. Judging by this map there are vast ATV wastelands in some parts of the country - I hope it's not true. We in Kent would particularly like to hear from people on the coast of East Anglia to try some long oversea contacts.

FAST SCAN TRANSMITTING STATIONS IN THE UK



10.10.1980

ATV UP-CONVERTER

by John Hopkins, G4DYP

This unit is designed to convert 70cm amateur television signals to the broadcast UHF TV band, thus enabling any domestic 625 line set to be used for amateur TV reception without modification. The converter is connected directly to the TV aerial socket.

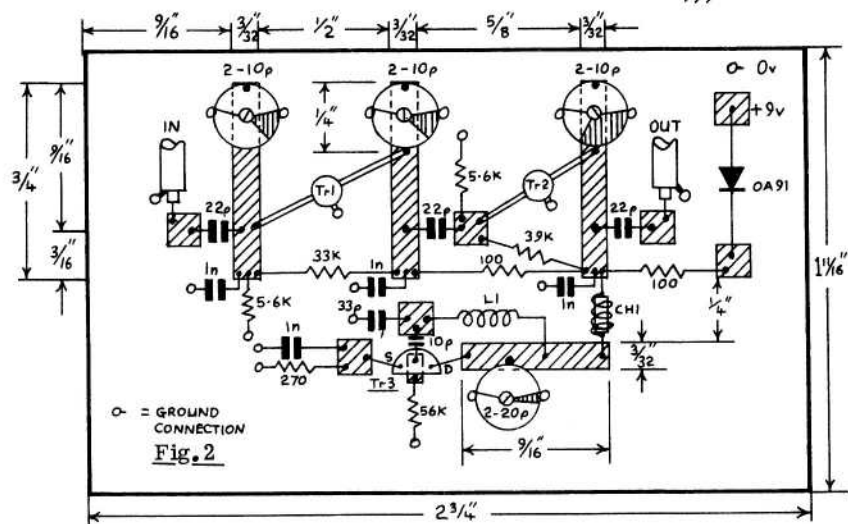
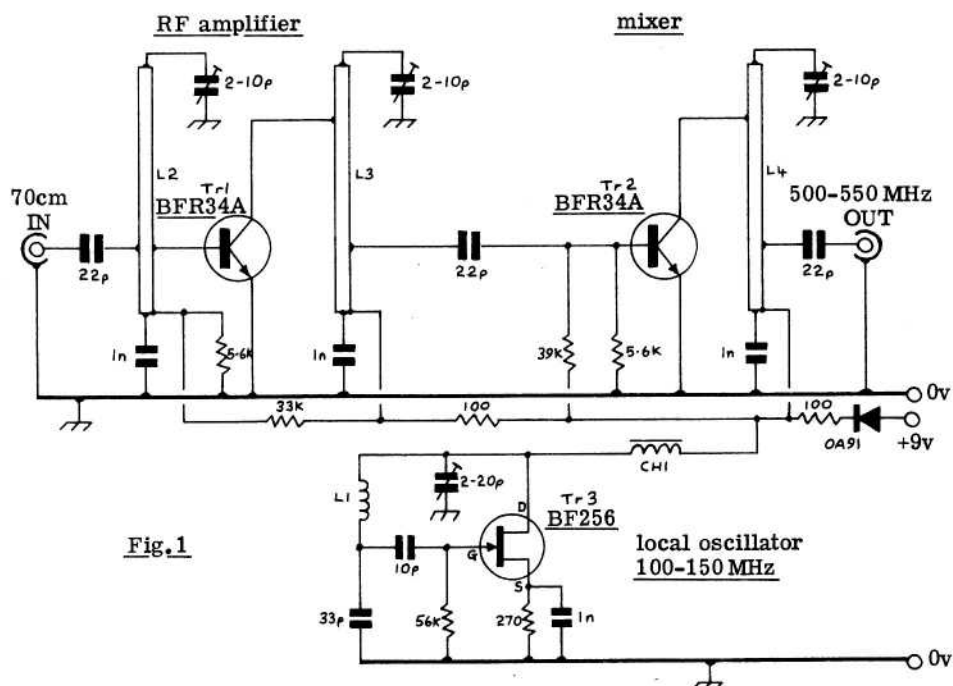
The design has been kept simple and uses a minimum number of components in order to enable more inexperienced constructors to build and adjust the unit without needing a special printed circuit board or elaborate test equipment. It is hoped that this up-converter will fill a gap in amateur receivers and will encourage more people onto 70cm TV.

CIRCUIT DESCRIPTION.

BFR34A transistors were chosen for the RF amplifier and mixer stages because of their excellent performance and low cost.

The aerial is coupled to the input tuned line L2 via a 22pF capacitor, the line is tuned to 70cm by the 2-10pF trimmer capacitor at one end. A second tuned circuit is used at the amplifier output to further improve the selectivity of the converter and to provide a low impedance feed to the mixer. The mixer collector circuit is tuned to the chosen IF frequency and although the tuned line L4 is the same size as L2 and L3 there is sufficient range on the 2-10pF trimmer capacitor to accommodate the higher frequency.

The local oscillator is a standard LC circuit which is tunable over the range 100 to 150 MHz approximately. Other frequencies could be used by varying the coil L1 and/or the 2-20pF trimmer. Local oscillator injection is unconventional in that it relies on stray coupling into the mixer, this is achieved by the proximity of the components, especially L1 and for this reason the layout shown in Fig 2 should be followed closely. In practice this method of coupling has proved to be as good as other more conventional methods and, providing the component positions are as shown, has proved to be repeatable.



CIRCUIT AND LAYOUT DIAGRAMS

COMPONENTS.

All capacitors should be good quality disc or tubular ceramic types and resistors are $\frac{1}{4}$ W. Trimmer capacitors should be ceramic for preference but good quality plastic types may be satisfactory.

Choke CH1 is made by close winding as many turns of 34swg or similar enamelled copper wire as will fit onto a $\frac{1}{4}$ W 1M resistor. L1 is 9 turns of 20swg enamelled copper wound on a 3/16" diameter former, 3/8" long self supporting. Although the oscillator is sufficiently stable for TV purposes purists might like to wind L1 onto an insulated former and coat it with epoxy to prevent any flexing of the turns.

CONSTRUCTION.

Although printed circuit techniques are used to ensure repeatability of performance it is not necessary to etch and drill a conventional printed circuit board.

Take a piece of single sided copper laminate board 2,3/4 x 1,11/16 inches and place it copper side uppermost, now cut out the pieces indicated by the shaded areas in Fig 2 from another piece of similar board using a small saw. Glue these pieces copper side up to the main board so that the copper is insulated from the earth plane (position as shown in Fig 2). The small square pads are $\frac{1}{4}$ " square, their actual positions on the board are not critical but should be close to those shown in Fig 2.

ALIGNMENT.

Set all trimmers to the positions shown in Fig 2. The oscillator may be checked by listening on a 2 meter receiver for a carrier whilst adjusting the oscillator trimmer capacitor over its range.

Connect the output to the aerial socket of a domestic TV set adjusted to a convenient channel around ch 30, switch on the converter and adjust the oscillator and mixer trimmers for maximum noise. Connect a signal generator (or use a local amateur TV signal) to the aerial socket and tune the oscillator trimmer to receive the signal, finally peak the RF amplifier and mixer trimmers to maximum.

CONCLUSION.

Several up-converters have been built in the midlands, all have performed well and are in regular use. The unit was directly compared with a modified ELC1043/05 tuner together with a TP491 stripline pre-amplifier, although the up-converter exhibited a slightly lower overall gain there was little difference between the two systems. An RF pre-amplifier with around 10-12dB gain could possibly give an improvement although this is likely to be marginal.

continued on page 13 →

REMEMBER...

THAT subscriptions of £3 per year are due on the first of January 1980. Please forward your remittance to the Hon. Treasurer without delay as reminders are not issued. A subscription renewal form is enclosed with this magazine.

Members are requested not to pay their subscription by bankers order as problems can arise due to many factors, not the least of which is the need to review the subscription rates more frequently than in the past.

Overseas members are asked to forward cheques on London banks only due to the high conversion charges on foreign banks.

A BATC windscreen sticker will be given to members who renew their subscriptions by 1st Feb. 1981. This will be enclosed with the next magazine after that date.

Any members who have already paid their subscription for 1981 should please ignore the renewal form.

Don't delay, send it today.
Tomorrow you will have
forgotten.

Arthur Rix,
Hon. Treasurer, BATC,
17 Forest Drive East,
London.
E11 1JX

ATV UP-CONVERTER.....

If you require the converter output to be above about 700 MHz the local oscillator frequency will need to be above 250 MHz. To do this the oscillator coil L1 should be 5 turns of 20swg copper wire wound on a 1/8" former, spaced as shown. The 33pF series capacitor to ground should also be changed to 10pF.

Contest News

This note is being written in the "aftermath" of the B.A.T.C. convention at Leicester as I was able to persuade our new Editor to allow me a small extension to his copy deadline in order to include the (U.K. only) results of the 1980 International TV Contest.

Conditions appear to have been uniformly awful with the only contact into Europe being a one way only by G4CRJ with F3YX in Paris at 365 KMS. G4CRJ reports rapid QSB on his signal so perhaps he found a convenient aircraft reflection.

Activity was reported as being quite good with well over 50 stations active. It does seem that during the contest 144.70 - 144.80 becomes very clogged and some stations reported that 144.17 on SSB was much better for talk back. G8HBR/P commented that it was difficult to know where people were transmitting sound - 144.17 SSB or 144.75 FM or Inter-carrier or 70 CMS FM so it is probably sensible to indicate your sound frequency on your caption.

So you will see the results printed below and congratulations to the G8MNY/P Group who operated from 800 ft up in the Chilterns to win by a good margin from the G8SCG/P Group who were on Pistern Hill, South of Derby.

Full international results will follow as soon as possible.

INTERNATIONAL ATV CONTEST SEPT 1980 - U.K. POSITIONS

POSITION	CALLSIGN	POINTS	CONTACTS	QRA	FEET ASL	PWR	ANT	BEST DX (KMS)
1	G8MNY/P	2078	18	ZL26F	800	100	88M	GW800J/P - 147
2	G8SCG/P	1382	14	ZM13E	-	10	2X23	GW800J/P - 176
3	G4CRJ	1159	15	ZL38B	200	150	88M	F3YX - 365
4	G4DYP	1094	12	ZM21G	500	14	88M	GW800J/P - 135
5	G8EGG	1024	10	ZL77H	700	6	-	G8OVX/P - 63
6	G3YQC	994	10	YM54C	-	10	18P	GW800J/P - 145
7	G81WX	980	7	AL52H	500	100	88M	G8MNY/P - 94
8	G8VBC	819	11	ZM13E	500	10	11	GW800J/P - 160
9	G8OVX/P	703	13	ZL39H	-	50	-	G8EGG - 63
10	G8E1M	513	13	ZL39H	-	12	88M	G8EGG - 63
11	G4BVK/P	506	5	YL48C	750	10	21T	G8MNY/P - 104
12	G8DLX	494	5	ZM54B	400	20	18P	G8MNY/P - 172
13	G8HBR/P	467	5	YN39H	-	10	17P	G8D1R - 103
14	G41MO	390	5	AL34B	100	150	46M	G4CRJ - 85
15	G8SUY	290	6	AL55G	50	100	46M	G81WX - 38
16	G8PTH	281	5	AL56G	250	120	48M	G41MO - 40
17	G8FNR	126	4	YL48H	185	20	46M	GW800J/P - 39
18	G8GLQ	126	4	YL48H	185	150	48M	GW800J/P - 39
19	G8KGH	94	3	YL48H	250	20	88M	GW800J/P - 39

It has been decided to repeat the early spring activity week albeit in a slightly different form. Contestants last year expressed a preference to use the one night per week system used in the RSGB UHF/SHF contests and so that is how we will play it this time.

BATC ACTIVITY CONTEST 1981

DATES: 31st Jan - 8th/16th/24th Feb - 4th/12th/20th March.

TIME: 20.00 - 23.00 GMT each day.

SCORING: Logs have to be entered per band operated - a maximum of four sessions will count for points - if you operate on more please enclose details for checking purposes.

A) Two-way QSO on 70cm: 2 points/km.

B) Two-way QSO on 23cm: 8 points/km.

C) Two-way QSO on 3cm: 16 points/km.

Multi-op-stations may only use one callsign.

Crossband QSO's must be entered in the log for the transmit band.

EXCHANGES: The following data is to be exchanged;

1. Code-group, which consists of four digits, individually chosen by each entrant, i.e. 1865 or 9732. The code group must be exchanged in video only.

2. Call, QTH-locator, report, serial number starting at 001 each session, this data to be exchanged via video or phone.

Should one of the stations fail in receiving the picture of the other, the scores of both stations are to be halved.

144.75, 144.80 and 144.17 MHz are well known ATV calling channels.

Please QSY from these frequencies as soon as a QSO is established.

CONTACTS: The same station may only be contacted once per band on each night.

LOGS: Must include postal address, locator, and station details and be mailed not later than April 3rd to:-

G. SHIRVILLE G3VZV

18 Church End,

Milton Bryan,

Milton Keynes,

Buckinghamshire MK17 9HR.

G4CRJ has mentioned that he is active on 10GHz TV and would like to know other callsigns who are similarly equipped with a view to arranging some /p contacts. Info to me please or direct to G4CRJ - QTHR. Thats all for this time.

73,

GRAHAM SHIRVILLE G3VZV

A HIGH-SPEED VIDEO SWITCH

By John Goode.

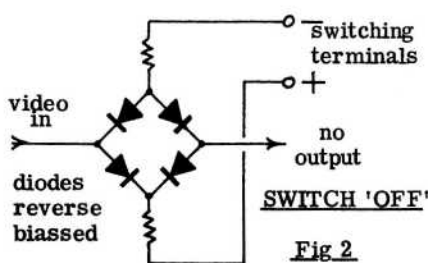
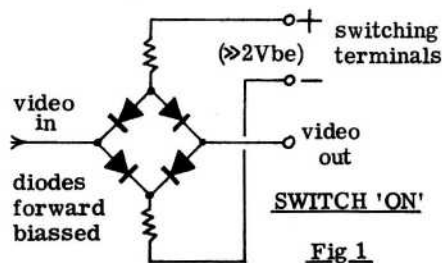
During the last seven years I have built three different video-effects units, all using switching based upon the diode bridge. The circuit described in this article has good bandwidth and works with colour, it switches fast enough for caption-keying, and can be adjusted to give minimal transients at the switching-edge.

Fig 1 shows a diode bridge in the 'on' condition, provided that the forward biasing voltage across the switching terminals comfortably exceeds $2 \times V_{be}$ (say 1.4v), the bridge will pass a video signal with virtually no attenuation. Fig 2 shows the 'off' condition where the polarity of the voltage across the switching terminals is reversed, turning the diodes hard off. A high degree of signal rejection is achieved, although this depends also on the input resistance of the following stage.

The circuit of the video switch is shown in Fig 3. With any effects switch it is necessary to restore the DC components to each input signal before switching so that the black-level of any split-screen signal is constant. For simplicity I have included a pair of diode DC restorers since these require no clamp pulses. The DC restorer is perfectly adequate for non-composite video, or for composite video that has correct amplitude syncs. It also has the advantage of not being affected by the burst if colour signals are to be passed.

If a back-porch keyed-clamp is preferred a small coupling capacitor (100n) should be used and a 47uH inductor included in the collector circuit of the clamp transistor to prevent any colour burst affecting DC clamping. The 'clamp balance' preset control is used to equalize the black-levels of the input signals, and the 'bias' preset is adjusted to minimise any pre-shoot or overshoot at the switching point.

From the description of the bridge action it will be realised that 'push-pull' (antiphase) control voltages are required, and the emitter-coupled pair of BSX20 transistors provide this so that there is a single, TTL - compatible control input.



17



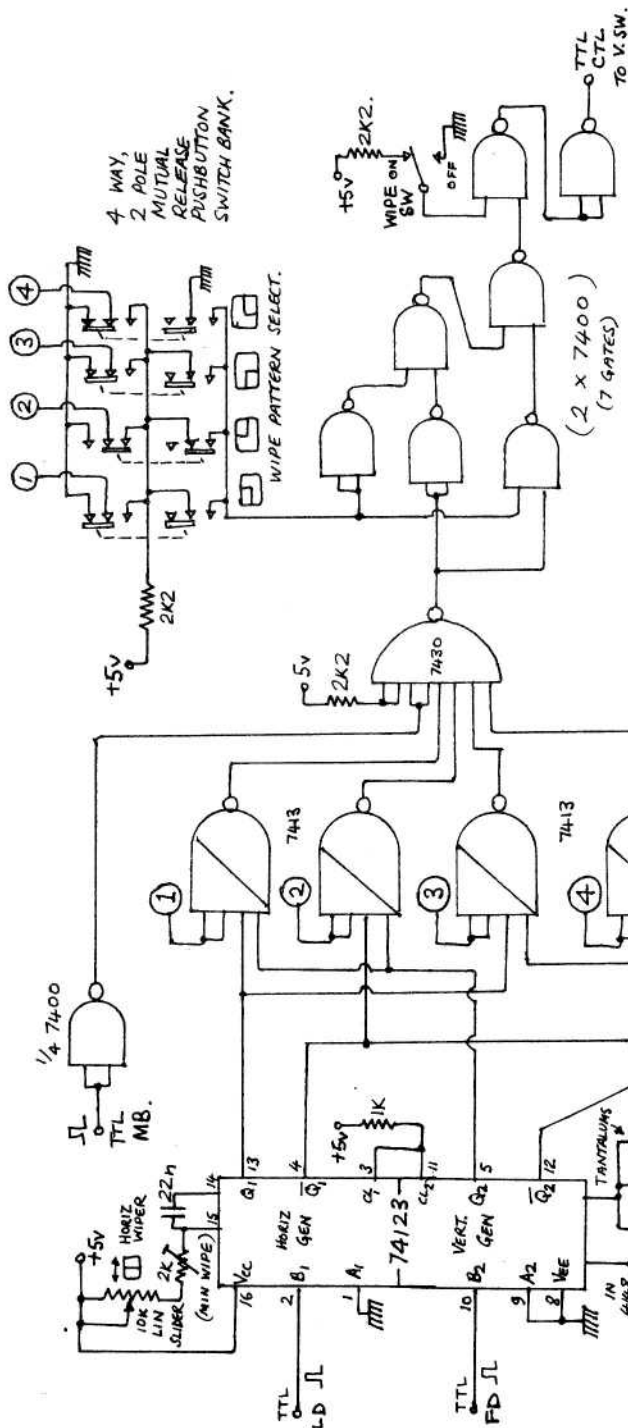
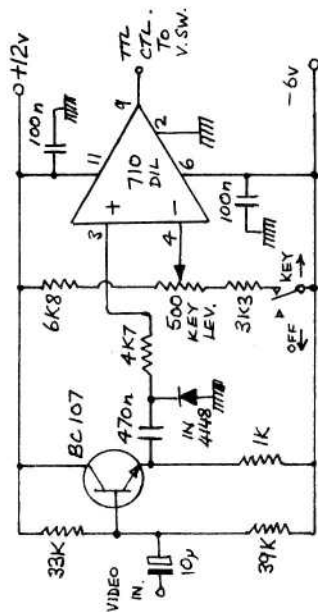


FIG 4 KEY PROCESSING CIRCUIT.



Considering Figs 3 and 4 it will be seen that to key a caption, white lettering on a black background is required - either from a camera or character generator. The main picture signal is applied to the 'A' video input and the caption signal to both the 'B' and the key processor input. Key processing 'cuts a hole' in the main picture which is 'filled' from input 'B'. Because of the inevitable slight delay in the key processing circuit compared to the 'B' video chain, a 'drop-shadowed' or 'relief' effect results which can be controlled to some degree by the key level control. This makes the caption stand out against light backgrounds, and is obviously much simpler than professional 'outline' circuits requiring delay lines.

Fig 5 shows a TTL circuit that provides the four standard corner-wipes. The 74123 dual monostable is triggered by line and field drives, thus generating the basic wipe signals that are gated by two 7413's controlled by the wipe-pattern push buttons. The 7413 outputs are combined in the 7430 gate with a blanking signal. The group of 7400 gates then control the polarity of the switching signal so that the 'wipe' slider potentiometers always operate in the same direction, no matter which wipe pattern is selected. The final two gates are optional, allowing the wipe pattern to be 'switched in' if desired.

Finally, returning to Fig 3, it will be seen that the output circuit is labelled 'TO HIGH Z', this means that it is not suitable for driving a 75 ohm load. I would strongly recommend that a processing amplifier is placed at the output so that the signal is re-blanked, and clean syncs are added.

MEMBERSHIP FORMS.

PLEASE NOTE that the old membership forms will become out of date at the end of this year. A new 'gold' form has been prepared and members wishing to keep stocks of the form may obtain them from; Mike Crampton, G8DLX.

16 Percival Road, Hillmorton, Rugby.
Warwickshire.



THE BRITISH AMATEUR TELEVISION CLUB

Statement of accounts for the year ended 31st December 1979

GENERAL ACCOUNT

	<u>Year ended</u> <u>31st December 1979</u>		<u>Year ended</u> <u>31st December 1978</u>
INCOME:			
Entry fees	74.50		89
Subscriptions: Current	1,678.00		1,850
Arrears	20.00		144
Donations	<u>28.00</u>	1,800.50	<u>10</u> 2,093
Sales of amateur TV booklets	152.25		635
SSTV booklets	<u>13.35</u>		<u>12</u>
	165.60		647
Less cost of sales	<u>16.95</u>	148.65	<u>118</u> 529
Sales of CQ-TV	193.78		222
Advertising income	<u>72.00</u>	265.78	<u>58</u> 280
Building society interest		254.80	133
Profit on sale of typewriter		0.00	19
		<u>2,469.73</u>	<u>3,054</u>
EXPENDITURE:			
CQ-TV printing	1,187.91		1,239
Postages	<u>407.57</u>		<u>507</u>
	1,595.48		1,746
General postages & stationery	188.07		287
RSGB affiliation fee	3.25		3
Committee meeting expenses	34.95		139
Expenses of shows	16.20		-
Depreciation of equipment	<u>20.00</u>	1,857.95	<u>25</u> 2,200
SURPLUS for the year		<u>£ 611.78</u>	<u>£ 854</u>

TRADING ACCOUNT

Sales of equipment etc.		978.97		857
Less cost: Stock 1.1.79	371.40			380
Purchases	<u>1,112.02</u>			<u>658</u>
	1,483.42			1,038
Stock 31.12.79	<u>655.76</u>	827.66		<u>371</u> 667
PROFIT for the year		<u>£ 151.31</u>		<u>£ 190</u>

BALANCE SHEET AT 31st DECEMBER, 1979.

	<u>Year ended</u> <u>31st December 1979</u>	<u>Year ended</u> <u>31st December 1978</u>
<u>RESOURCES OF THE CLUB</u>		
<u>Accumulated Fund</u>		
Balance at 1-1-1979	3,951.30	2,907
Surplus on general account	611.78	854
Profit on trading account	<u>151.31</u> <u>763.09</u>	<u>190</u> <u>1,044</u>
Balance at 31-12-1979	<u>£ 4,714.39</u>	<u>£ 3,951</u>
Represented by:-		
<u>FIXED ASSETS</u>		
<u>Office equipment at 1-1-1979</u>	101.00	
Less depreciation	<u>20.00</u> 81.00	101
<u>CURRENT ASSETS</u>		
Stocks: Trading	655.76	371
CQ-TV magazines	44.95	36
Amateur TV booklets	33.45	51
SSTV booklets	5.00	5
Stationery	<u>15.00</u>	<u>87</u>
	754.16	550
Debtors	175.10	-
Balances with: Bank	665.13	823
Giro	65.52	164
Building soc'	<u>3,790.15</u>	<u>3,035</u>
	<u>5,450.06</u>	<u>4,572</u>
<u>CURRENT LIABILITIES</u>		
Creditors	67.67	194
Subscriptions paid in advance	<u>749.00</u>	<u>528</u>
	<u>816.67</u>	<u>722</u>
NET CURRENT ASSETS	<u>4,633.39</u>	<u>3,850</u>
	<u>£ 4,714.39</u>	<u>£ 3,951</u>

I have prepared the foregoing General Account and Trading Account for the year ended 31st December 1979, and the Balance Sheet at 31st December 1979 from the books and records of the club, and certify them to be in accordance therewith.

BRIGG
18th March 1980

Alan P. Pratt
Chartered Accountant

NBTV ~ A REVIEW

Volume 6 number 1 of NBTV, the journal of the Narrow Bandwidth Television Association, has been received at the CQ-TV editorial office.

It seems that it is the season for magazine problems because Doug Pitt- the associations chairman- says that they have been having trouble with the printing arrangements and that this issue is an improvised three man effort. For all that the magazine is well produced and shows little evidence of the difficulties encountered.

The contents include; REPORTS, detailing the various experiments and techniques being carried out or used by members, one of which gives news of a forthcoming article on a glass bead disc monitor. CONVENTION, reporting on this years NBTVA get-together at Nottingham in April. CLUB SERVICES, giving details of components, equipment and information available to members, an AGONY COLUMN and PHOTONEWS, which shows photographs of members and their equipment.

The magazine also includes technical articles such as a xenon tube driver, neon drivers, sync seperator, amplifier and a 'missing pulse' circuit which is a camera CRO raster generator.

For anyone interested in NBTV details of the association may be obtained from;

D. B. Pitt,
1 Burntwood Drive,
Wollaton,
Nottingham, NG8 2DJ

NBTV on Top Band.

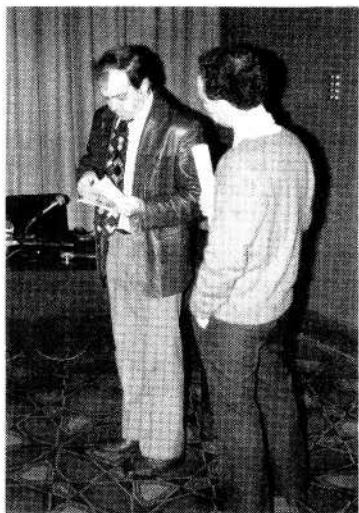
In January 1972 Dan Van Elkan (VK3UI) collaborated with Chris Long, a then 18-year-old NBTV enthusiast, in broadcasting 48 line moving pictures from Melbourne on the 1.8 MHz band. These were the first low definition TV transmissions since the close-down of station 3DB, earlier, 3UZ, in 1932. Incidentally, the engineer in charge of this station, Mr. Gil Miles (VK2KI) is currently an active member of the NBTVA.

Chris Long has more recently collaborated with Tony Sanderson (VK3AML) in the sending of 32 line NBTV signals from Melbourne, again on the 1.8 MHz band. Other amateurs were requested to clear the band during the transmissions, which lasted for about an hour on Saturday night, 20th September 1980. Pre-arranged receiving stations at Adelaide (430 miles north-west) and Sydney (470 miles north-east) picked up the signals via repeater. The Adelaide team included VK5KG (Wireless Institute of Australia), Chris Long, and thirteen other watchers. At Sydney, Gil Miles monitored and recorded the incoming signals. Both receiving points reported recognisable portraits and readable captions, though fading occurred at times and signal-to-noise ratio was often low.

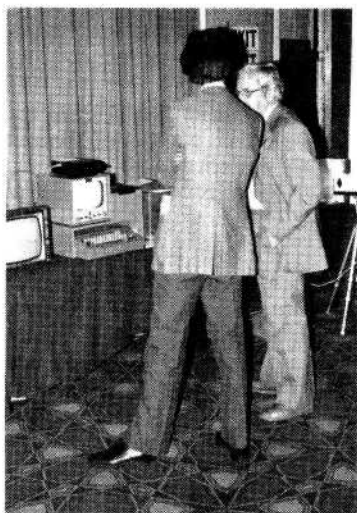
The Melbourne transmitter used 150W of output into a 70 foot top-loaded aerial. Transmission was direct from tapes, prepared by Chris Long, with no sync pulses and at a reduced frame rate of 8 pictures per second. Bandwidth cut-off was set at about 6 KHz, and both negative and positive (amplitude) modulation were tested for comparison.

After the results have been analysed, it is hoped that more ambitious experiments will be attempted in the near future.

Doug Pitt.
(Chairman NBTVA)



Mike Crampton (Chairman (R)) & John Wood (Editor (L)), discussing weighty matters!



Grant Dixon (R) at his SSTV display.

70cm LOG PERIODIC

By Lewis Elmer. G8EUP

There is no doubt that the best all-round aerial for TV work is the multi element Yagi. It is however, not the only type which can be used. If gain is not a primary consideration then other types offer certain advantages; one such is the log-periodic aerial.

The log-periodic aerial consists of a number of half-wave dipoles whose lengths and the spacing between them decrease in a geometric progression. All elements are driven and are fed from a balanced feeder, the connection to adjacent elements being taken from alternate wires to maintain the correct phase. This is shown diagrammatically in Fig 1 which also indicates that the aerial is fed from the end having the shortest elements, and that the feeder terminates in a short circuit situated $1/8$ wavelength behind the longest element.

The main advantages of the log-periodic are:

- i) over the pass-band the gain and phase are constant.
- ii) the polar diagram shows no side lobes.
- iii) the front to back ratio is high.

The log-periodic aerial is normally used in wide band designs but there is no reason why a narrow band version can not be constructed. The design given here uses 10 elements to cover the 432 to 440 MHz amateur TV band and, with care, can be made to give a gain of over 10dBd.

The balanced line feeding the dipoles is also the supporting boom and consists of two lengths of 15mm square aluminium tube separated by a 3.5mm thick aluminium spacer placed $1/8$ of a wavelength behind the longest element, and a 3.6mm thick polythene spacer placed between the 9th and 10th elements. The aluminium spacer also acts as the line terminator and the polythene spacer must be fixed with a nylon screw.

The lengths and spacing of the elements are given in table 1. The element length is the distance from the boom to the element tip. The dimensions are given to 0.1mm which may seem to be more accurate than is necessary, however, to get the best out of any aerial it is necessary to be accurate in your work. Aerials just do not have the 'convenient' dimensions that some books give.

The elements themselves are made from $1/8$ " diameter aluminium rod, and are arranged to project on alternate sides of the booms as shown in Fig 2.

They should be cut longer than necessary initially and then filed to the exact length after they have been fixed to the boom. Various methods of fixing are possible; They could be welded (not to be recommended to the inexperienced since aluminium melts very suddenly and the whole lot may collapse) or soldered with aluminium solder or, if the holes are made to give a tight fit, the elements can be secured by centre punching around the hole.

The aerial is fed at the short end using UR57 (75 ohm) coaxial cable as shown in Fig 3. The hole in the bottom of the lower boom is made big enough to take the full width of the cable. That in the top of the lower boom is drilled to allow the polythene inner to pass through and the hole in the bottom of the upper boom is drilled to take the centre conductor only. The centre conductor is then bent over inside the boom and a small metal plate 12mm x 20mm is placed on top of the wire and then secured with a wooden wedge.

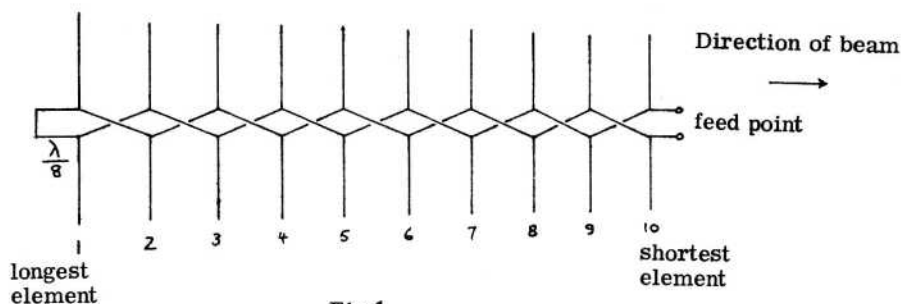


Fig 1

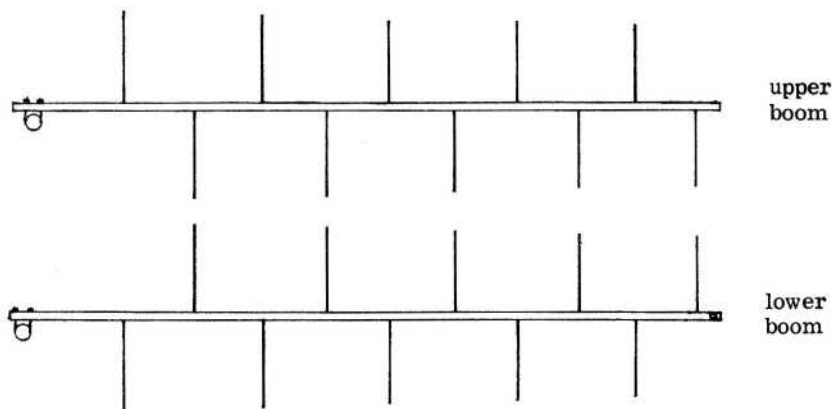


Fig 2

A similar plate with a hole in it to take the cable minus its outer polythene is also used inside the lower boom, the braiding is separated and a wedge driven in to secure it. The ends of the boom are then closed with a polythene bung. The cable is then taken back along the boom to the other end where the short circuit is situated and, since this is a point of zero voltage, if the outer braiding of the coaxial cable is fixed here then no currents will be allowed to flow in the outer, thus acting as a balanced to unbalanced connection.

SOURCES OF SUPPLY.

The 15mm square aluminium boom was obtained from a local TV aerial erection firm. The 1/8" diameter rod is actually uncoated welding rod 99.5% aluminium. This comes in 750mm lengths and is sold by weight, it is obtained from welding equipment suppliers. If the above materials cannot be obtained exactly then, provided the differences are not too great, the effects will be a slight shifting of the frequency band which will not be serious, however the impedance of the aerial will alter and some experimentation with the separation of the booms will be necessary to get the best SWR. The aerial is fixed to the mast with two exhaust pipe clamps obtainable from motor accessory shops. Make sure the clamps are long enough to go through the boom. Finally the area around the clamps and the coaxial feed point should be painted with clear polyurethane varnish to protect against moisture and corrosion.

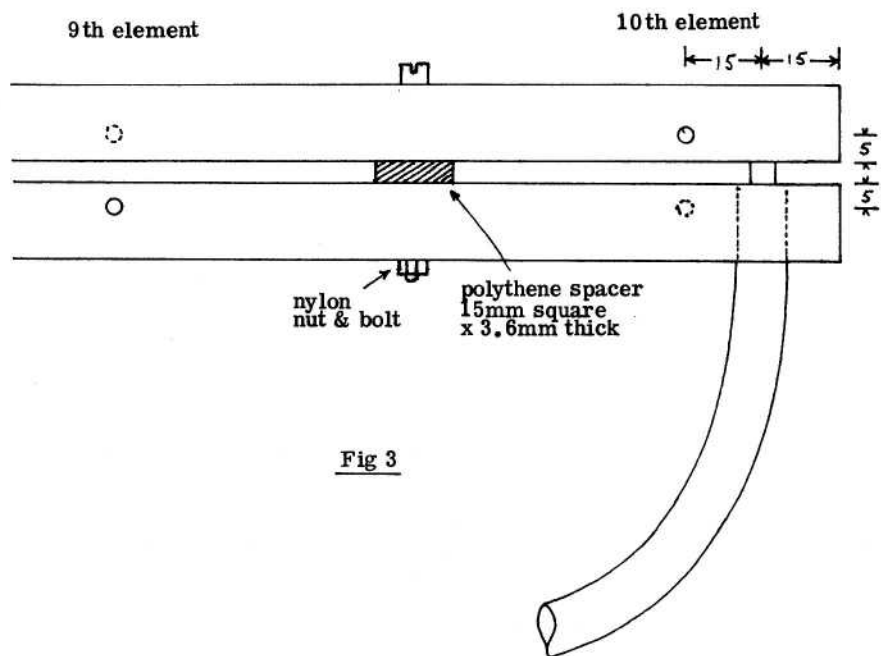
reference

The design of log-periodic dipole antennas - Robert Carrel. IRE convention record Vol 9 part 1, 1961 pages 61 to 75.

<u>ELEMENT No.</u>	<u>PROJECTION FROM BOOM</u>	<u>SEPERATION</u>	<u>COMULATIVE DISTANCE FROM EL' 1</u>
1	171.4mm		
2	167.9mm	129.9mm	129.9mm
3	164.5mm	127.3mm	257.1mm
4	161.2mm	124.7mm	381.1mm
5	158.0mm	122.2mm	504.0mm
6	154.8mm	119.8mm	623.8mm
7	151.6mm	117.4mm	741.2mm
8	148.6mm	115.0mm	856.2mm
9	145.6mm	112.7mm	969.0mm
10	142.6mm	110.5mm	1079.4mm

SHORT. 86.8mm behind element 1.
 BOOM. 15mm square aluminium tube.
 ELEMENTS. 1/8" (3.175mm) diameter aluminium rod.
 BOOM SEPERATION. 3.5mm at element 1
 3.6mm at element 10

TABLE 1



AERIAL BITS

How many times have you wanted to build your own aerial? but have not been able to locate the various pieces of hardware needed.

Those days are now past for Aerial Contractors (Southern), of 28 Caulfield Road, Shoeburyness, Essex. (Tel: 03708-3717) have lists of such components available to the amateur.

The lists cover items like terminal boxes and covers, element clips, alloy rods and plastic 'X' type insulators. Also aluminium elements and booms as well as complete aerial systems.

40p in stamps to the above address will bring all the gen.

QUICK QUOTE

'For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he hath sufficient to finish it?'

Anyone know where that comes from?

ED.

Publications

The following items are available from BATC publications:-

SLOW SCAN TELEVISION by B.J. Arnold G3RHI, published by BATC,
second edition, .35p plus .12p postage.

CQ-TV BACK ISSUES. The following issues are still available although stocks of some are very low: CQ-TV 68, 69, 73, 76, 77, 79, 82, 83, 86, 87, 89, 90, 91, and 93 onwards. **PRICE:-** CQ-TV numbers up to 92 .25p, CQ-TV 93 and onwards .50p each. Please add sufficient postage.

REPRINTS (photo copies) of any article in past issues of CQ-TV can be supplied at 5p per sheet plus postage. Payment preferably in UK postage stamps.

INDEX of all main articles in past CQ-TV magazines including page count for all articles. Essential if ordering reprints. **PRICE** .40p (preferably in UK postage stamps) plus a large (9" x 4") s.a.e.

All publications are available from;

BATC Publications,
14 Lilac Avenue,
Leicester.
LE5 1FN

Please do not send orders to Club Sales.

COMING SOON

A new "Amateur Television Handbook" is at present being prepared and will be published by the BATC this winter.

This book will replace "Amateur Television" and will contain modern, up to date designs almost all of which have never before been published.

Printed circuit boards will be available for most of the designs which will include; A full colour electronic test card, an electronic character generator with page memory, a complete TV receiver panel, a high performance 70cm converter, a transistorised transmitter, a vision switching unit and lots more.

THIS BOOK WILL SET THE STANDARD!

WATCH THIS SPACE FOR FURTHER DETAILS.

CROSSWORD

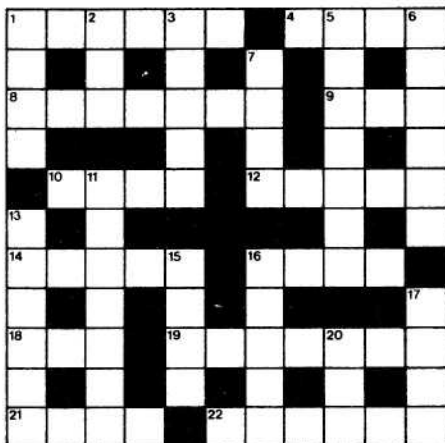
ACROSS

1. Elevated
4. Feeder
8. One bit at a time
9. Chain of links
10. Large scale
12. U.S. anode
14. A lens
16. Memorandum
18. Impatience to a scotsman
19. Sets of scanning lines
21. Unusual
22. Thin paste

DOWN

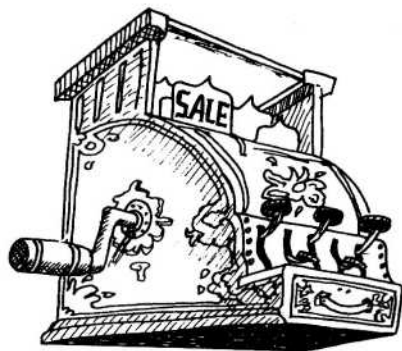
1. Sums
2. Amateur radio installation
3. Loft
5. Perform too much
6. Surgeon's instrument
7. Slight mistake
11. Vessel
13. A flag
15. Computer memory
16. of the nose
17. Catch sight of
20. Piece of corn

No 112



This crossword is not all related to amateur radio.

Solution will be in CQ-TV 113.



MARKET PLACE

Adverts are placed in this column free of charge to paid up members. An address label from a recent CQ-TV envelope should accompany your ad.

Adverts are accepted from non-members at a cost of 3p per word. Display ads are available, details of which may be obtained from the editor.

FOR SALE

AMPEX 1" VTR with tape and manual
£100.

SHIBADEN SV610 VTR and TU200 TV
monitor and tapes. £150.

NATIONAL WV341N modern camera with
viewfinder. £150.

MARCONI V320 modern camera with
viewfinder. £150.

B/W camera with lens. £50.

1" video tape. £2 each.

A Cusworth. 25, Cowper Crescent,
Leeds 9. Tel: Leeds 496048

FOR SALE

NEW printed circuit boards for G8CGK
SSTV pattern generator. With all data
cost £3.50 ea, no reasonable offer
refused.

J. Hopkins G4DYP 13 Church Street,
Chasetown, Walsall, Staffs.

FOR SALE

PCB, Japanese version of Robot 400 SC77.
Circuit description and constructional
details, majority of ICs for this circuit
not including 4k RAMS.

Price complete £75 including postage.
24141060 LSGT Anderson. The Queens
Coy, 1 Gren Gds, Wavell Barracks,
BFPO 45

FOR SALE

AMPEX VTR VR5103 needs attention,
with manual £100.

BRAND new Ampex video tape 3000ft
x 1inch £15 per reel.

CATV distribution converters model
26E (Teling) IF output 52.75 MHz.

26 switched input channels believed
45 - 200 MHz approx, with AFC and
internal mains PSU £10 each (6 off).

TELING CATV bi-directional amplifier
model DL350. 50 - 300 MHz, 26dB
gain at 300 MHz £20.

TELING head amplifier model DY7330,
bands 1,2 and 3. £20 with mains PSU.

FOR SALE.

3 monochrome monitors, £5 each.

3 Marconi vision switching panels
50p each.

1 14" wide neck mag focus CRT 50p.

Mains operated desk calculator £5.

MK2002 character generator chips
with instructions to make them

'characterise' £3 each.

Projection TV EHT unit £4.

D. J. Long G3PTU. 70 Carr Hill Road,
Upper Cumberworth, Huddersfield,
West Yorkshire.

FOR SALE

Cintel 28881 21" B/W monitor. Works
well. With manual, £15.

FOR SALE

A compact virtually indestructable TV transmitter that runs off 12 volts and puts out 10 watts on 70cm. Yes, it does exist and could be yours for £90. Send A4 size SAE for full range of established PC Electronics products. No funny business.

RS (Radiospares) components obtained to your exact order at reasonable prices. Monoscope tubes still eagerly sought. Andrew Emmerson, G8PTH. 4 Mount Pleasant, Blean Common, Canterbury, Kent. CT2 9EU Tel; 0227 77 471 after 2030 and weekends.

"OWING to a mistake of mine, my VTR was advertised at the wrong price in CQ-TV 110".
IKEGAMI $\frac{1}{2}$ " EIAJ machine (compatible with many others including some Sonys), hardly used, with electrical remote control of all main functions is available with many tapes at £100 ONO.
2400' reel £4 (discount for quantity).
30mm yoke with used Plumbicon or Leddicon. Two types available £50 ea.
25mm yoke with used vidicon £10.
Carriage extra on all items.
D. Wilson. 4 Harkness Close, Bletchley, Milton Keynes, MK2 3NB
01-883-6420 ext. 123 daytime.

EXCHANGE for any TV gear.

EMI EHT power supply, variable from 100v DC to 2.5Kv. Metered with leads and manual, cct etc. (laboratory instrument).

PHOTAX camera (optical) 35mm lens 1.3 - 3.5 variable iris, focus never used with or without adaptor to use with C mount (TV camera)
J. Brown, 1 Silverdale Road, Falmouth, Cornwall. TR11 4HW

PROJECT 100

Printed circuit boards for Project 100 are available from; Tom Mitchell G3LMX
27 Hanmer Road, Simpson, Milton Keynes, Bucks. MK6 3AY

FREE!

21" round colour TV tube, AX53-14, complete with scan coils and 6CB5A line output valve. Free to good home. I need the space.

R. Hubbard, 58 Queens Road, Tankerton, Whitstable, Kent. CT5 2JG

WANTED

5FP7 CRT and possibly a set of scan coils to suit for SSTV monitor.
C. Youens G4GDW "Old Stocks", Flaunden Lane, Felden, Hemel Hempstead, Herts.

WANTED

5FP7 CRT and scan coil assembly together with focus coil.
T. Hodgetts. 92 Deans Way, Gloucester, GL1 2QD Tel. 29736 between 5 & 7pm.

WANTED

ELC1043 tuner on 70cm. UHF modulator to use 70cm on a domestic set. (up-converter) All postages paid.
D. Anderson. 1 Grenadier Guards, Wavell Barracks, BFPO 45

WANTED

B/W vidicon camera eg. Pye Lynx or similar with tube and lens.
M. Lee. 34 Beechwood Avenue, Kew, Richmond, Surrey TW9 4DE
Tel; 01-876-4379 evenings.

WANTED

COMPLETE SECAM 111 coder, either working or in parts with a schematic. Price offered up to around \$200. Someone please help as my need is great.
E. W. Mercer. Thaskalaki No.17, Athens 608. Greece.

WANTED

COLOUR monitor, preferably transistorised, about 20" but not critical. Video tape recorder, possibly faulty, suitable for 625 lines, preferably not metal heads.

P. Kemmis. 92 Wildwood Road,
London, NW11 6UD
Tel: 01-455-0953

WANTED

SSTV camera and/or scan converter suitable for driving a transmitter. Alternatively any information on such a system would be most welcome.
A. Villani. via Lungomare Marconi, n55, 84100 Salerno, Italy.

WANTED

VIDEO head for Ampex VTR VR5103, anything considered, even slightly worn or different machine! WHY?
N. Harrold G4IMO. "Hillcroft, Lark Hill Road, Canewdon, Rochford, Essex. SS4 3RZ
Tel: Canewdon 389

FOR SALE

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ERRATA

The following corrections refer to the vision mixer article by David Wilson in CQ-TV 110:

- 1) The resistances referred to on page 10 as being marked * are not, and these are the 1k in the collector of the second transistor after 'fader volts' input on page 14 and also the 2.2k after the zener diode. These and the zener diode should be 'adjust on test'.
- 2) The coupling capacitor on the input to the proc' amp, after the first emitter follower from the fader amps should be 100uF.
- 3) The unmarked 1k preset just before the output is the white clipper.
- 4) On the clamp pulse amp, the base bias resistors following the 680pF capacitors are 15k and not 1.5k as shown.
- 5) The dotted line between MS LD and MB FD on the pulse DA inputs should have been accompanied by a slightly higher value of coupling capacitor against MB FD to cope with the wider pulses. I suggest 33 or 47uF.

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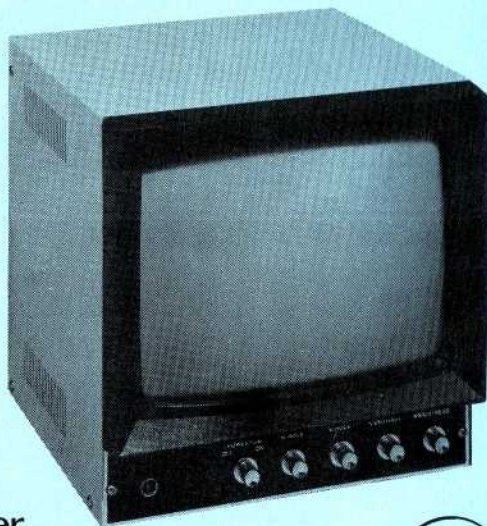
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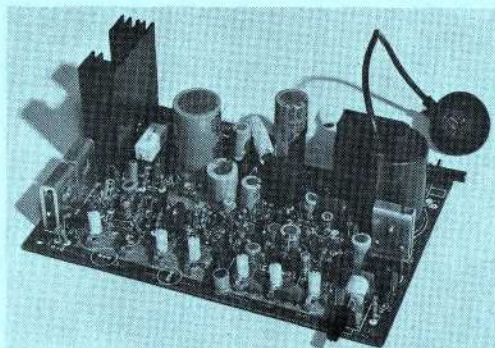
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